TAB 15: USDA AGRICULTURE RESEARCH SERVICE

UNITED STATES DEPARTMENT OF AGRICULTURE
AGRICULTURAL RESEARCH SERVICE
CHINA ACTIVITY REPORT

Prepared by:
The Office of International Research Programs
January 7, 2004

US-China S&T Participation

Program Title Sino- American Biological Control Lab (Sino-ABCL) **Year** Ongoing

Participating US Agencies USDA ARS

Participating PRC Agencies CAAS

Does project falls under the 1979 S&T Agreement with China? Yes X No

Brief Description of Activity:

ARS operates four Overseas Biological Control Laboratories (OBCLs) whose mission is to find and study biological control agents for use against invasive pests of American agriculture.

A MOU signed in 1988 established the Sino-ABCL as a joint venture between ARS and the Chinese Academy of Agricultural Sciences (CAAS). The lab operates with three scientists and five technicians from the CAAS under specific guidelines found in the Cooperative Agreements signed every five years.

The lab is currently studying the following pests; Termites, Japanese beetle, Wheat stem sawfly, Asian longhorn beetle, Saltcedar, Alligatorweed, Water hyacinth, Russian olive, Kudzu, Mile-a-minute weed, and Leafy Spurge.

Objectives/Results of Activity:

Identity and biological assessment of invasive species (especially when the pest species is unknown), area of origin studies, exploration to determine pest-specific natural enemy complexes, basic biology and host-specificity testing, collection/processing/shipment of natural enemies, and international leadership by linking American scientists with foreign cooperators, personnel, information, ideas, materials and other resources.

Transfer of technology or exchange of information? Yes X No

If yes, please describe technology or information that was transferred:

Information related to research topic.

Total Expenditure approximately $100,000 annually

Results of Project: Development of invasive species strategies

Follow-on activities planned? Ongoing

US-China S&T Participation

Program Title: Biotechnology: Collaborative work included arraying and screening BAC (bacterial artificial chromosome) recombinant DNA libraries of wheat. **Year:** 2002

Participating US Agencies: USDA-ARS

Participating PRC Agencies: CAAS
Does project falls under the 1979 S&T Agreement with China? Yes__X__ No____

Brief Description of Activity:
Visiting Scientist at WRRC for approximately 18 months ending May 31, 2002

Objectives/Results of Activity:
Dr. Kong collaborated in this work and in the isolation and sequencing of several loci of the high-molecular-weight (HMW) glutenins, proteins playing critical roles in wheat quality.

Transfer of technology or exchange of information? Yes__X__ No_____
If yes, please describe technology or information that was transferred:
Information related to research topic.

List Participants below

ARS Scientist/Lab: Olin Anderson, Genomics and Gene Discovery Research Unit, Albany, CA
Chinese Counterpart: Xiu-Ying Kong, Chinese Academy of Agricultural Science

Visited the U.S.: **Yes**

Total Expenditure $ 0*

Results of Project: TBD

Follow-on activities planned? Yes__X__ No____
If yes, please describe activity up to 2010 if available.

Ongoing discussions for further collaborations

* ARS contributed lab space for cooperator and in kind contributions

US-China S&T Participation

Program Title Biotechnology: Development rice gene markers **Year** August 2001 - March 2003

Participating US Agencies: USDA-ARS
Participating PRC Agencies: Zhejiang University
Does project falls under the 1979 S&T Agreement with China? Yes_X__ No___

Brief Description of Activity: Development of three dominant rice *Pi-ta* blast resistance gene markers for MAS

Objectives/Results of Activity: Evaluate and enhance rice germplasm by a combination of molecular and agronomic procedures.

Transfer of technology or exchange of information? Yes__X__ No___
If yes, please describe technology or information that was transferred:
This is a good example of using biotechnology for accelerating conventional crop breeding for new cultivar development.

List Participants:
ARS Scientist/Lab: Yulin Jia and J. Neil Rutger, Dale Bumpers National Rice Research Center, Stuttgart, AR
Chinese Counterpart: Zhonghua Wang, Yingwu Xia, and Dr. Diangxin Wu, Institute of Nuclear Agricultural Science, Zhejiang University

Visited the U.S.: **Yes**

Total Expenditure $ 0*

Results of Project: TBD

Follow-on activities planned? Yes_____ No__X___
If yes, please describe activity up to 2010 if available.

* ARS contributed lab space for cooperator and in kind contributions

US-China S&T Participation

Program Title Biotechnology: Molecular basis of crop protection against soilborne pathogens by bacterial biological control agents **Year** Ongoing

Participating US Agencies USDA-ARS

Participating PRC Agencies Shanghai Jiaotong University and Hangzhou Agricultural University

Does project falls under the 1979 S&T Agreement with China? Yes X No ____

Brief Description of Activity:
In December of 2002, Dr. Thomashow visited the laboratories of Yuquan Xu, Shanghai Jiaotong University and Bingxing Zhang, Hangzhou Agricultural University, to present seminars and to discuss her research on the molecular basis of crop protection against soilborne root pathogens by bacterial biological control agents. Both of these laboratories are engaged in related research.

Objectives/Results of Activity:
Both collaborating labs work mainly on vegetable crops and my main interest there is rice, so discussions are underway to include some work on rice in these studies.

Transfer of technology or exchange of information? Yes X No ____
If yes, please describe technology or information that was transferred:
Exchange of information on soilborne root pathogens and possibly exchange of biological control agents

List Participants:
ARS Scientist/Lab: Linda Thomashow, Root Disease and Biological Control Research Unit, Pullman, WA.
Chinese Counterpart: Yuquan Xu, Shanghai Jiaotong University, and Bingxing Zhang, Hangzhou Agricultural University

Visited the U.S.: No

Total Expenditure $ 0*

Results of Project:
Informal collaboration. ARS Scientist will return to Chinese Universities to initiate studies using PCR-based techniques to identify new biocontrol agents from Chinese soils.

Follow-on activities planned? Yes X No ____
If yes, please describe activity up to 2010 if available.
Dr. Thomashow will return to China to explain and demonstrate the techniques and get the work underway. The Chinese will carry out studies for some time after she returns to the US, and she will have access to any strains they ultimately isolate.

* ARS participated through in kind contributions

US-China S&T Participation

Program Title Biotechnology: Arborvirus diagnostic methods **Year** Ongoing

Participating US Agencies USDA-ARS

Participating PRC Agencies National Quarantine Institute in Qindao
Does project falls under the 1979 S&T Agreement with China? Yes X No

Brief Description of Activity:
Dr. Wilson is currently a consultant on research proposals Chinese Ministry of Agriculture submitted by his Chinese counter parts. The Foreign Animal Disease Laboratory has previously funded two of their scientists to work in Dr. Wilson's laboratory and one trip for Dr. Wilson to visit the new laboratory facilities in Qindao. Dr. Wilson has provided recombinant plasmids for generation of positive controls for PCR based diagnostic test. This exchange was covered by a Material Transfer Agreement.

Objectives/Results of Activity:
Develop arborvirus diagnostic methods

Transfer of technology or exchange of information? Yes X No
If yes, please describe technology or information that was transferred:
Information related to research topic.

List Participants:
ARS Scientist/Lab: William Wilson, Arthropod-Borne Animal Diseases Research Laboratory, Laramie, WY
Chinese Counterpart: National Quarantine Institute in Qindao (Z. Wang and Z.R. Zheng)

Visited the U.S.: **No**

Total Expenditure $ 0*

Results of Project: TBD

Follow-on activities planned? Yes X No
If yes, please describe activity up to 2010 if available.
May expand informal collaboration to include DNA vaccine development work

* ARS participated through in kind contributions

US-China S&T Participation

Program Title Biotechnology: Micro-sectioning and cloning of amplified sequences from chromosome arms of wheat **Year** Ongoing

Participating US Agencies USDA-ARS

Participating PRC Agencies CAS

Does project falls under the 1979 S&T Agreement with China? Yes X No

Brief Description of Activity:
Informal Collaboration to micro-section and clone of amplified sequences from chromosome arms of wheat.

Objectives/Results of Activity:
Acquire, characterize and breed native and introduced range and pasture plants that are environmentally sustainable and meet the needs of conservation, restoration, renovation and reclamation of semiarid rangelands and pastures in the western U.S.

Transfer of technology or exchange of information? Yes X No
If yes, please describe technology or information that was transferred:
Information related to research topic.

List Participants:

ARS Scientist/Lab: Richard Wang, Forage & Range Research Lab, Logan, UT
Chinese Counterpart: Zanmin Hu, Institute of Genetics and Development Biology, CAS

Visited the U.S.: **Yes/No**

Total Expenditure $ 0*

Results of Project:
Ongoing

Follow-on activities planned? N/A
If yes, please describe activity up to 2010 if available.

* ARS participated through in kind contributions

US-China S&T Participation

Program Title Biotechnology: Avian Influenza Diagnosis **Year** Ongoing

Participating US Agencies USDA-ARS
Participating PRC Agencies Department of Fisheries and Agriculture, Hong Kong
Does project falls under the 1979 S&T Agreement with China? Yes X No

Brief Description of Activity:
Ongoing assistance on rapid diagnosis of avian influenza H5N1 by real time RT-PCR and pathobiology of H5N1 avian influenza viruses in poultry species.

Objectives/Results of Activity:

Transfer of technology or exchange of information? Yes X No
If yes, please describe technology or information that was transferred:
Information related to research topic.

List Participants:

ARS Scientist/Lab: David Suarez, Southeast Poultry Research Lab, Athens, GA
Chinese Counterpart: Trevor Ellis and Kitman Dytring, Department of Fisheries and Agriculture, Hong Kong

Visited the U.S.: **Yes/No**

Total Expenditure $ 0*

Results of Project: TBD

Follow-on activities planned? N/A
If yes, please describe activity up to 2010 if available.

* ARS participated through in kind contributions

US-China S&T Participation

Program Title Biotechnology: Wheat Scab Resistance **Year** Ongoing

Participating US Agencies USDA-ARS

Participating PRC Agencies Jangsu Academy of Agricultural Sciences

Does project falls under the 1979 S&T Agreement with China? Yes X No____

Brief Description of Activity:
Mapping of wheat scab resistance genes from Chinese resistance sources

Objectives/Results of Activity:
Characterize quantitative wheat traits, develop high-thoughput DNA markers for scab resistance, and test wheat breeding populations for scab resistance using simple sequence repeat (SSR) markers.

Transfer of technology or exchange of information? Yes X No____
If yes, please describe technology or information that was transferred:
Information related to research topic.

List Participants below

ARS Scientist/Lab: Guihua Bai, Plant Science and Entomology Research Unit, Manhattan, KS
Chinese Counterpart: H-Q Ma and Weizhong Lu, Crop Physiology and Genetics Institute, Jangsu Academy of Agricultural Sciences

Visited the U.S.: **Yes/No**

Total Expenditure $ 0*

Results of Project: TBD

Follow-on activities planned? N/A
If yes, please describe activity up to 2010 if available.

* ARS participated through in kind contributions

US-China S&T Participation

Program Title Biotechnology: Wheat Scab Resistance **Year** Ongoing

Participating US Agencies USDA-ARS

Participating PRC Agencies Jangsu Academy of Agricultural Sciences

Does project falls under the 1979 S&T Agreement with China? Yes X No

Brief Description/Objectives of Activity:
Investigation of genetic relatedness of scab resistance germplasm with molecular markers

Transfer of technology or exchange of information? Yes X No
If yes, please describe technology or information that was transferred:
Information related to research topic.

List Participants:

ARS Scientist/Lab: Guihua Bai, Plant Science and Entomology Research Unit, Manhattan, KS
Chinese Counterpart: Shi-Bin Cai, Food Crop Institute, Jangsu Academy of Agricultural Sciences

Visited the U.S.: **Yes/No**

Total Expenditure $ 0*

Results of Project: TBD

Follow-on activities planned? Yes No X
If yes, please describe activity up to 2010 if available.

* ARS participated through in kind contributions

US-China S&T Participation

Program Title Biotechnology: Disease Resistance in Melon **Year** Ongoing

Participating US Agencies USDA-ARS

Participating PRC Agencies National Engineering Research Center for Vegetables

Does project falls under the 1979 S&T Agreement with China? Yes X No

Brief Description/Objectives of Activity:
Development of a genetic linkage map for watermelon (Citrullus lanatus) and on enhancing disease resistance in melon (Cucumis melo).

Transfer of technology or exchange of information? Yes X No
If yes, please describe technology or information that was transferred:
Information related to research topic.

List Participants:
ARS Scientist/Lab: Amnon Levi and Claude Thomas, U.S. Vegetable Laboratory, Charleston, SC
Chinese Counterpart: Yong Xu, National Engineering Research Center for Vegetables, Beijing

Visited the U.S.: **Yes/No**

Total Expenditure $ 0*

Results of Project: TBD

Follow-on activities planned? Yes No X
If yes, please describe activity up to 2010 if available.

* ARS participated through in kind contributions

US-China S&T Participation

Program Title Biotechnology: Development of better perennial cool-season forage grasses **Year** Ongoing

Participating US Agencies USDA-ARS

Participating PRC Agencies Academy of Agricultural and Forestry Sciences

Does project falls under the 1979 S&T Agreement with China? Yes X No

Brief Description of Activity:
Dr. Zhao sent seed of wheat lines containing Leymus multicaulis (Siberian wheatgrass) chromosome additions, which Dr. Kindiger is growing to select among for potential hybridization with perennial distant relatives of wheat, and other studies. Kindiger sent seed of a number of perennial cool-season species to Zhao. Work is under extramural agreement (Individual Memorandum of Understanding), number 58-6218-1M-F004, expiration date Sept. 30, 2005.

Objectives/Results of Activity:
Development of better perennial cool-season forage grasses.

Transfer of technology or exchange of information? Yes X No
If yes, please describe technology or information that was transferred:
Information related to research topic.

List Participants:

ARS Scientist/Lab: Bryan Kindiger, Forage And Livestock Production Research, El Reno, OK
Chinese Counterpart: Zhao Mao-Lin, Beijing Agricultural Biotechnology Research Center, Beijing Academy of Agricultural and Forestry Sciences

Visited the U.S.: **No**

Total Expenditure $ 0*

Results of Project: TBD

Follow-on activities planned? Yes No X
If yes, please describe activity up to 2010 if available.

* ARS participated through in kind contributions

US-China S&T Participation

Program Title Biotechnology: Genome Research in Cotton **Year** Ongoing

Participating US Agencies USDA-ARS
Participating PRC Agencies Nanjing Agricultural University
Does project falls under the 1979 S&T Agreement with China? Yes X No

Brief Description of Activity: Molecular breeding to develop new hybrids and cultivars via MAS and transgenic strategy in cotton.

Objectives/Results of Activity: Genome research in cotton, including: construction of linkage group, molecular tagging of important genes or QTLs and gene cloning for fiber development.

Transfer of technology or exchange of information? Yes X No
If yes, please describe technology or information that was transferred:
Information related to research topic.

List Participants:
ARS Scientist/Lab: Sukumar Saha, Crop Science Research Lab, Starksville, MS and R.J. Kohel, Crop Germplasm Research Unit, College Station, TX.
Chinese Counterpart: Zhang Tianzhen, Cotton Research Institute, Nanjing Agricultural University

Visited the U.S.: **Yes/No**

Total Expenditure $ 0*

Results of Project: TBD

Follow-on activities planned? Yes No X
If yes, please describe activity up to 2010 if available.

*ARS participated through in kind contributions

US-China S&T Participation

Program Title Saltcedar Biological Control Program **Year** Ongoing since 1992
Participating US Agencies USDA-ARS

Participating PRC Agencies Nanjing Agricultural University
Does project falls under the 1979 S&T Agreement with China? Yes X No

Brief Description/Objectives of Activity:
This program discovers and conducts initial biological, ecological and host range studies for candidate insect control agents for introduction into the U.S. to control Saltcedar. This program is dependent on Xinjiang Agricultural University and the Sino American Biological Control Laboratory in Beijing.

Transfer of technology or exchange of information? Yes X No
If yes, please describe technology or information that was transferred:
Information related to research topic.

List Participants:

ARS Scientist/Lab: C. Jack DeLoach, Grassland, Soil and Water Research Lab, Temple TX
Chinese Counterpart: Baoping Li, Department of Entomology, Nanjing Agricultural University

Visited the U.S.: **Yes/No**

Total Expenditure $10,000

Results of Project: TBD

Follow-on activities planned? Yes No X
If yes, please describe activity up to 2010 if available.

US-China S&T Participation

Program Title Biotechnology: Selenium Supplementation **Year** 9/01/01 - 8/31/06

Participating US Agencies USDA-ARS

Participating PRC Agencies Chinese Academy of Preventive Medicine

Does project falls under the 1979 S&T Agreement with China? Yes X No

Brief Description of Activity:

Selenium supplementation of subjects with extremely low selenium intakes

Objectives/Results of Activity:

To develop foods that are enhanced in selenium, using non-GMO biotechnology (selenium fertilization). We are then testing the efficacy of these foods for restoring depleted selenium status in human subjects in a selenium deficient area of China.

Transfer of technology or exchange of information? Yes X No

If yes, please describe technology or information that was transferred:

Information on selenium fertilization

List Participants:

ARS Scientist: John Finley, Grand Forks Human Nutrition Research Center, Grand Forks, ND

Chinese Counterpart: Dr Junquan Gao, Chinese Academy of Preventive Medicine, Beijing

Visited the U.S.: **Yes/No**

Total Expenditure $ 0*

Funded by a grant from the Initiative for Future Agriculture and Food Systems (IFAFS) program.

Results of Project: TBD

Follow-on activities planned? Yes No X

If yes, please describe activity up to 2010 if available.

* ARS participated through in kind contributions

US-China S&T Participation

Program Title Biotechnology: Hazelnut Tissue Culture and Cryopreservation **Year** November 2003-2004

Participating US Agencies USDA ARS

Participating PRC Agencies Institution of Economic Forestry
Does project falls under the 1979 S&T Agreement with China? Yes X No

Brief Description of Activity:
Dr. Dongmei Yu will collaborate with Dr. Barbara Reed on hazelnut tissue culture and cryopreservation and possibly participate in molecular biology projects with hazelnut as well. This visit is related to an earlier collaboration on hazelnut tissue culture with the Forestry Institute.

Objectives/Results of Activity:
To develop and refine hazelnut cryopreservation techniques.

Transfer of technology or exchange of information? Yes X No
If yes, please describe technology or information that was transferred:
Information related to research topic.

List Participants:

ARS Scientist: Barbara Reed, National Clonal Germplasm Repository, Corvallis, OR
Chinese Counterpart: Dr. Dongmei Yu, Liaoning Institution of Economic Forestry, 252 Yulin Street, Ganjingzi District, Dalian China 116033, has received a fellowship from the China Scholarship Council(CSC)

Visited the U.S.: **Yes**

Total Expenditure $ 0*

Results of Project: TBD

Follow-on activities planned? Yes No X
If yes, please describe activity up to 2010 if available.

* ARS participated through in kind contributions

US-China S&T Participation

Program Title Biotechnology: Signal Transduction During the Stress Response in Plants **Year** Ongoing
Participating US Agencies USDA ARS

Participating PRC Agencies Hebei Academy of Agricultural Sciences
Does project falls under the 1979 S&T Agreement with China? Yes X No

Brief Description of Activity:
The research is on signal transduction during the stress response in plants, involving both wheat and Arabidopsis.

Objectives/Results of Activity:
The long-term goal is aimed at understanding and avoidance of adverse effects on plant growth and productivity caused by drought, heat, etc.

Transfer of technology or exchange of information? Yes X No
If yes, please describe technology or information that was transferred:
Information related to research topic.

List Participants:

ARS Scientist: Jan Miernyk, Plant Genetics Research, Columbia, MO
Chinese Counterpart: Ren-gang Zhou, Institute of Agro-physics, Physiology and Biochemistry, Hebei Academy of Agricultural Sciences, Shijiazhuang, P.R. China

Visited the U.S.: **Yes/No**

Total Expenditure $ 0*

Results of Project: TBD

Follow-on activities planned? Yes No X
If yes, please describe activity up to 2010 if available.

* ARS participated through in kind contributions

US-China S&T Participation

Program Title Dairy Production **Year** December 2002 - January 2004

Participating US Agencies USDA ARS

Participating PRC Agencies CAS

Does project falls under the 1979 S&T Agreement with China? Yes X No

Brief Description of Activity:
Nutrient Cycling and Environmental Impacts of Dairy Farms in China and Wisconsin

Objectives/Results of Activity:
1) Characterize current practices & identify opportunities, obstacles, & innovative solutions to manage agricultural nutrients on dairy farms; 2) Compare yields, profitability, & environmental impact of cash grain & dairy farming systems; 3) Evaluate tools to identify nutrient BMPs & develop comprehensive nutrient management plans for dairy farms; & 4) Identify sustainable farming practices that reduce production, environmental, & economic risks of dairy forage systems.

Transfer of technology or exchange of information? Yes X No
If yes, please describe technology or information that was transferred:
Information related to research topic.

List Participants:

ARS Scientist: J. Mark Powell, U.S. Dairy Forage Research Center
Chinese Counterpart: Chinese Academy of Sciences

Visited the U.S.: **Yes/No**

Total Expenditure $ 0*

Results of Project: TBD

Follow-on activities planned? Yes X No
If yes, please describe activity up to 2010 if available.
Proposal submitted to ARS-FAS in March 2003 to continue the project through December 2005.

* Funded by the Babcock Institute, University of Wisconsin-Madison.

US-China S&T Participation

Program Title Agricultural Products Processing **Year** November 2002

Participating US Agencies USDA ARS
Participating PRC Agencies Chongqing Fruit Research Institute

Does project falls under the 1979 S&T Agreement with China? Yes__X__ No_____

Brief Description/Objective of Activity:
The purpose of this trip was to assist with the Chinese with off-flavor development problems during storage and to exchange information on citrus quality post-harvest.

Transfer of technology or exchange of information? Yes__X__ No_____
If yes, please describe technology or information that was transferred:
Information related to research topic.

List Participants:

ARS Scientist: **Robert Hagenmaier, Citrus and Subtropical Products Laboratory, Winter Haven, FL**
Chinese Counterpart: Zhang Yungui, Chongqing Fruit Research Institute

Visited the U.S.: **No**

Total Expenditure $ 0*

Results of Project: TBD

Follow-on activities planned? Yes_____ No__X___
If yes, please describe activity up to 2010 if available.

* ARS participated through in kind contributions

US-China S&T Participation

Program Title Agricultural Products Processing **Year** Ongoing

Participating US Agencies USDA ARS

Participating PRC Agencies Northeast Agricultural University/China Agricultural University

Does project falls under the 1979 S&T Agreement with China? Yes X No

Brief Description of Activity:

Work in the development and cooperation of joint education and research programs.

Objectives/Results of Activity:

Both fundamental and applied research approaches are used to solve problems and develop new agricultural products processing techniques to improve the healthfulness and marketability of agricultural products.

Transfer of technology or exchange of information? Yes X No

If yes, please describe technology or information that was transferred:

Information related to research topic.

List Participants:

ARS Scientist: Zhongli Pan, Processed Foods Research Institute

Chinese Counterpart: Northeast Agricultural University/China Agricultural University

Visited the U.S.: **Yes/No**

Total Expenditure $ 0*

Results of Project: TBD

Follow-on activities planned? Yes No X

If yes, please describe activity up to 2010 if available.

* ARS participated through in kind contributions

US-China S&T Participation

Program Title Predictive Microbiology Tools in China **Year** October 2003 to present
Participating US Agencies USDA ARS

Participating PRC Agencies Shanghai Fisheries University/East China Sea Fisheries Research Institute

Does project falls under the 1979 S&T Agreement with China? Yes X No

Brief Description of Activity:
Predictive microbiology could play an important role in their task. They are interested in introducing the ARS Pathogen Modeling Program (PMP) software package to Chinese food industries. We provided them with the text for the PMP and they have now translated it into Chinese. We are currently integrating the translated text into the software program. We anticipate having this completed by the end of the year.

Objectives/Results of Activity:
This project is designed to improve the microbiological situation in the Chinese fishery industry.

Transfer of technology or exchange of information? Yes X No
If yes, please describe technology or information that was transferred:
Information related to research topic.

List Participants:

ARS Scientist: Mark Tamplin/Microbial Food Safety Research Unit, Eastern Regional Research Center, Wyndmoor, PA
Chinese Counterpart: Dr. Bailin Li, Associate Professor, Food Science Dept., Shanghai Fisheries University and Dr. Xianshi Yang, Associate Professor, East China Sea Fisheries Research Institute

Visited the U.S.: **Yes/No**

Total Expenditure $ 0*

Results of Project: TBD

Follow-on activities planned? Yes No X

US-China S&T Participation

Program Title Natural Resource Management **Year** 8/2001-8/2002

* ARS participated through in kind contributions

Participating US Agencies USDA ARS

Participating PRC Agencies
Does project falls under the 1979 S&T Agreement with China? Yes__X__ No____

Brief Description/Objective of Activity:
Collaborative research to improve and adapt the Wind Erosion Prediction System for understanding, assessing and reducing wind erosion**.**

Transfer of technology or exchange of information? Yes__X__ No____
If yes, please describe technology or information that was transferred:
Information related to research topic.

List Participants:

ARS Scientist: **USDA-ARS Wind Erosion Research Unit, Manhattan, KS**
Chinese Counterpart: Dr. Yubao Li, Assoc. Prof., Inner Mongolia Agricultural University

Visited the U.S.: **Yes/No**

Total Expenditure $ 0*

Results of Project: TBD

Follow-on activities planned? Yes_____ No__X__
If yes, please describe activity up to 2010 if available.

* ARS participated through in kind contributions

US-China S&T Participation

Program Title Natural Resource Management **Year** October 2001-2002

Participating US Agencies USDA-ARS
Participating PRC Agencies Beijing Normal University
Does project falls under the 1979 S&T Agreement with China? Yes X No

Brief Description of Activity: A collaborative research program on dust emission processes.

Objectives/Results of Activity:
Research focused on aeolian processes and the adaptation of the Wind Erosion Prediction System for improved management of natural resources in China.

Transfer of technology or exchange of information? Yes X No
If yes, please describe technology or information that was transferred:
Information related to research topic.

List Participants:

ARS Scientist: **Wind Erosion Research Unit, USDA-ARS-Grain Marketing and Production Research Center, Manhattan, KS**
Chinese Counterpart: Dr. Lianyou Liu, Professor, Beijing Normal University, China Center of Desert Research

Visited the U.S.: **Yes**
Total Expenditure $ 0[*]

Results of Project: TBD

Follow-on activities planned? Yes No X
If yes, please describe activity up to 2010 if available.

[*] His research is sponsored by the China Scholarship Council.

US-China S&T Participation

Program Title Natural Resource Management **Year** 4/00 to 10/00

Participating US Agencies USDA ARS

Participating PRC Agencies CAS

Does project falls under the 1979 S&T Agreement with China? Yes X No

Brief Description of Activity:
Dr. Yinli contributed to the research program in the area of crop eco-physiology, specifically water use and photosynthetic activity in Conservation Tillage Systems

Objectives/Results of Activity:
Dr. Yinli had an objective to learn new approaches and methods for research in natural resources, and to establish networks with U.S. scientists.

Transfer of technology or exchange of information? Yes X No
If yes, please describe technology or information that was transferred:
Information related to research topic.

List Participants:

ARS Scientist: **Harry Schomberg, D.M. Endale, D. Stark/ J. Phil Campbell Natural Resource Conservation Center**
Chinese Counterpart: Dr. Yinli Liang, Institute of Soil and Water Conservation, The Chinese Academy of Sciences, Yangling, Shaanxi, P.R. China

Visited the U.S.: **Yes**

Total Expenditure $ 0*

Results of Project: TBD

Follow-on activities planned? Yes X No
If yes, please describe activity up to 2010 if available.
Collaboration is ongoing; manuscripts are being developed by Chinese Scientist

* Funded by World Bank

US-China S&T Participation

Program Title Natural Resource Management **Year** January 2003 – December 2005
Participating US Agencies USDA ARS

Participating PRC Agencies Chinese Academy of Sciences

Does project falls under the 1979 S&T Agreement with China? Yes X No

Brief Description of Activity:
Dr. Ahuja led a team of four scientists to visit China in October 2002. Dr. Hu and Dr. Yu visited the Great Plains Systems Research Unit from October 2002 to December 2002 and from January 2003 to July 2003, respectively.

Objectives/Results of Activity:
Improving the Understanding of Crop Water and Nitrogen Stresses through Critical Field Experiments and System Models for Better Natural Resource Management

Transfer of technology or exchange of information? Yes X No
If yes, please describe technology or information that was transferred:
Information related to research topic.

List Participants:

ARS Scientist: **Laj Ahuja and Liwang Ma, Great Plains Systems Research Unit, Fort Collins, CO**
Chinese Counterpart: Qiang Yu, Institute of Geographic Sciences and Natural Resources Research, Chinese Academy of Sciences and Chunsheng Hu, Shijiazhuang Institute of Agricultural Modernization, Chinese Academy of Sciences

Visited the U.S.: **Yes**

Total Expenditure $ 0*

Results of Project: TBD

Follow-on activities planned? Yes X No
If yes, please describe activity up to 2010 if available.

US-China S&T Participation

* The Institute of Geographic Sciences and Natural Resources Research provides $100,000/year to this collaboration. ARS participated through in kind contributions

Program Title Vitamin A Equivalence of Plant Carotenoids in Children **Year** 2003-2006

Participating US Agencies USDA ARS and NIH

Participating PRC Agencies Institute of Nutrition and Food Safety

Does project falls under the 1979 S&T Agreement with China? Yes X No

Brief Description of Activity:

The bioconversion of beta-carotene to vitamin A and the bioavailability of other carotenoids and antioxidants phytochemicals will be examined using stable isotopes and hydroponically grown plants.

Objectives/Results of Activity:

To elucidate the bioavailability and bioconversion of dietary carotenoids

Transfer of technology or exchange of information? Yes X No

If yes, please describe technology or information that was transferred:

Information related to research topic.

List Participants:

Scientist/Lab - Guangwen Tang, USDA Jean Mayer Human Nutrition Research Center on Aging, Boston, Carotenoids and Health laboratory

Chinese Counterpart: Dr. Yin, Maternal and Child Nutrition, Institute of Nutrition and Food Safety

Visited the U.S.: **Yes/No**

Total Expenditure $ 0*

Results of Project: TBD

Follow-on activities planned? Yes No X

If yes, please describe activity up to 2010 if available.

* ARS participated through in kind contributions co-funded by NIH

US-China S&T Participation

Program Title Development of wheats with altered and improved end-use quality via genetics and biotechnology **Year** 2000-present

Participating US Agencies USDA ARS

Participating PRC Agencies CAS

Does project falls under the 1979 S&T Agreement with China? Yes X No
Brief Description of Activity:
The ARS scientist, R. Graybosch, spent 3 weeks in China in 2000, and established a cooperative project with Wang Tao, Chengdu Institute of Biology. This cooperation has led to the evaluation current U.S. wheat germplasm in Tibet, with donation of the materials for use in breeding programs both in Tibet and Sichuan. In addition, the cooperation has led to the establishment of the first waxy wheat breeding program in China. The next phase in the cooperation will be the evaluation of transgenic winter wheat in China. Such wheats over-express native glutenin proteins, and will provide strong gluten types for use in Chinese breeding programs and industrial baking applications.

Objectives/Results of Activity:
To determine whether increased expression of HMW (high-molecular weight) glutenin genes in wheat endosperm can result in improved baking quality of hard winter wheat, and if such approaches can confer greater environmental stability of quality, and to determine if there are any negative effects of transgenic expression on agronomic properties.

Transfer of technology or exchange of information? Yes X No
If yes, please describe technology or information that was transferred:
Information related to research topic.

List Participants:
ARS Scientist/Lab - Robert Graybosch, Wheat, Sorghum & Forages Unit, Lincoln, NE
Chinese Counterpart - Wang Tao, Associate Professor, Chengdu Institute of Biology Chinese Academy of Sciences, Chengdu 416 Box Sichuan 610041 China

Total Expenditure $ 0*

Results of Project: TBD

Proposed Activities

The following activities are in the planning stages and may potentially develop into projects over the next year. The Chinese Ministry of Science and Technology has said that it may consider the establishment of a new special fund to support the Sino-

* ARS participated through in kind contributions

US collaboration in Agricultural Science and Technology. For U.S. side, existing budget appropriations will cover the expenses of the selected collaborative projects in the priority areas agreed upon in the signed Protocol.

1. Title of Project: Subsurface Flow and Gully Erosion on Steep Loess Slopes.
Location of Project: The Upland Erosion Processes Research Unit (UEP) is an integral part of the National Sedimentation Laboratory in Oxford, Mississippi.
Goal: The incumbent would assist in the experimental work being conducted by the NSL on subsurface flow contributions to streambank failure and gully erosion as a result of soil layering and macropores.
Expected Outcomes: This work will determine the soil layering conditions and hydraulic properties under which subsurface flow contributes to stream bank failure and gully formation. Subsurface flows and sediment concentrations will be quantified along with the associated soil physical and hydraulic properties. Existing models for describing these processes will be used to evaluated their prediction capabilities. This work will expand current research efforts on methods to control or mitigate the surface (overland flow) runoff component of bank failure and erosion to include control of the subsurface flow component.

2. Title of Project: Development of Sediment Transport Relationships for Shallow Overland Flow
Location of Project: The Upland Erosion Processes Research Unit (UEP) is an integral part of the National Sedimentation Laboratory in Oxford, Mississippi.
Goal: This proposal seeks to better define and understand the dynamic nature of changes in the transport capacity for different sediment sizes, flow regimes and slope steepnesses.
Expected Outcomes: This proposal should lead to a better understanding of sediment transport processes in shallow flow and an improved definition of the dynamic nature of sediment transport capacity. The experimental findings should offer an opportunity to improve transport relationships for improved predictions of soil erosion on upland areas.

3. Title of Project: Airborne Particulate Sampler Design and Characterization.
Location of Project: The Wind Erosion Research Unit (WERU) is located close to the campus of Kansas State University in Manhattan, KS.
Goal: The incumbent would assist in developing and evaluating next generation particulate samplers for use in measuring and monitoring soil movement on agricultural fields. Two types of samplers would be considered: 1) an improved single batch catch field sampler that is easy to manufacture and deploy and 2) an automated field sampler that can monitor changes in flux rates during a wind erosion event.
Sampler design will employ the use of computational fluid dynamics programs, like FLUENT, to evaluate preliminary designs. The most promising designs would then be constructed and wind tunnel tested for catch efficiency over a wide range of particle size distributions and wind regimes.
Expected Outcomes: A fully characterized particulate sampler for field use would provide the means for collecting wind erosion data over a wider range of field conditions

that can be more easily compared. The improved particulate sampler would enhance the data quality for wind erosion research in both US and China.

4. Title of Project: Development of a Universal Sampling Protocol for Wind Erosion Events.
Location of Project: The Wind Erosion Research Unit (WERU) is located close to the campus of Kansas State University in Manhattan, KS.
Goal: The incumbent would review literature, unpublished internal WERU research reports/outlines, and interview leading wind erosion research scientists within WERU and the USA regarding field erosion event sampling. Specific issues to be addressed would include: a) plot location selection and layout; b) number, type and placement of field particulate samplers; c) number, type and placement of anemometers; d) selection and collection of other climatic data; and e) selection of and monitoring frequency of measurements to characterize changes in surface conditions, including roughness, vegetative cover and soil stability.
Expected Outcomes: A published document or documents that summarize and address the key issues a research scientist interested in measuring or monitoring wind erosion events on agricultural lands should know. Many individuals worldwide attempt such measurements but don't have the experience or knowledge to successfully characterize the events. This would be a definitive source that covers all the important aspects that must be considered when planning and executing such field studies.

5. Title of Project: Development for Control Practices for Gullies or Concentrated Flow Channels Suitable for the Semiarid Steep Loess Hills.
Location of Project: The Upland Erosion Processes Research Unit (UEP) is an integral part of the National Sedimentation Laboratory in Oxford, Mississippi.
Goal: The incumbent would assist in the experimental work being conducted by the NSL on conservation practices and vegetative barriers.
Expected Outcomes: Determine the applicability of no-till and the effectiveness of vegetative barriers for use in riparian zones to control gully erosion. Conservation practices tested under a broad range of topographic and geomorphic conditions in the U.S. will provide guidance for selection of appropriate systems for application and evaluation in the loess region of China.

6. Title of Project: Utilization of Byproducts to Reduce Erosion and Chemical Losses From Loess-Derived Soils
Location of Project: The Upland Erosion Processes Research Unit (UEP) is an integral part of the National Sedimentation Laboratory in Oxford, Mississippi.
Goal: The incumbent would assist in a laboratory and field research project with the goal of identifying and determining the effectiveness of a range of byproducts (i.e., power plant wastes, iron oxide sludge from water treatment plants, animal manures, cheese

whey) at improving the stability of surface soils, reducing soil erosion losses, and improving the quality of runoff from agricultural watersheds.
Expected Outcomes: Several outcomes are envisioned: (1) the utilization of byproducts will be expanded; (2) stabilization of surface soils will increase infiltration and available soil water contents; (3) water quality will be improved through reductions in sediment and chemical pollutant loadings; (4) air quality will be enhanced by lowering concentrations of suspended dust particles; (5) soil productivity, quality, and sustainability will be improved; (6) soil erosion losses will be reduced; and (7) an improved system for remediating degraded soils will be developed.

7. Title of Project: Soil Erosion Control With Surface Amendments
Location of Project: The National Soil Erosion Research Laboratory (NSERL) is a cooperative research endeavor of the USDA-Agricultural Research Service and Purdue University.
Goal: The incumbent would assist in laboratory and field experimentation on utilization of soil amendments to enhance infiltration and reduce runoff and soil loss.
Expected Outcomes: Improved information on the required rates of polyacrylamide to control rill erosion for a range of soil, slope, and climatic conditions. Determination of the effectiveness of PAM for protecting newly-constructed grass waterways. Reports and publications with recommendations for PAM use. All of this information will be of benefit to both U.S. and Chinese concerns.

8. Title of Project: Cropping Systems and Management Strategies to Enhance Rainfall Capture in Dryland Agriculture
Location of Project: The USDA-ARS research station at Big Spring, Texas.
Goal: The incumbent would assist in evaluating a wide range of tillage operations and soil amendments aimed at increasing soil water infiltration as well as the use of plastic films and sealed soil surfaces to funnel water to row crops.
Expected Outcomes: The evaluations of tillage operations and soil amendments will provide “ready to use” information for dryland agricultural producers of both countries. The modeling component will increase our understanding of water movement in both the soil and the atmosphere as well as providing a decision aid for farmers and identifying areas of uncertainty requiring further research. This research will also explore novel ways of directing rainfall from some areas of the field and concentrating it in others in order to delay the onset of drought in field crops such as cotton and sorghum.

9. Title of Project: Estimation of Suspended Dust from Soils in Western China and the Great Plains Region of the United States.
Location of Project: The Wind Erosion and Water Conservation Research Unit is located on the campus of Texas Tech University in Lubbock, Texas.
Goal: The incumbent would assist in developing a detailed understanding and mathematical model of the relationship of horizontal sediment flux and vertical dust flux based on experimental results collected at our field research station in Big Spring, Texas.
Expected Outcomes: New understanding of the factors controlling dust emissions from agricultural and natural systems will be developed. The dust emission model component

of WEPS will be further tested and improved. The component will be validated for the Southern Great Plains region of the United States and Western Chinese provinces and provide a means of assessing the dust emissions created by cropping systems into both regions.

10. Title of Project: Improving RUSLE2 Erosion Prediction Technology for Steep Slopes
Location of Project: The Upland Erosion Processes Research Unit (UEP) is an integral part of the National Sedimentation Laboratory in Oxford, Mississippi.
Goal: This proposal is designed to test, validate, and improve RUSLE2 technology for the latter conditions by utilizing soils loss data sets collected in China such as at the Ansai Experiment Station in Shaanxi Providence.
Expected Outcomes: The expected outcome is improved RUSLE2 technology for conservation planning on steep slopes in western China. The improved technology would also serve conservation planning needs for many other areas in the world, where steep slopes are in agricultural production.

11. Title of Project: Utilization of Objective Modeling System to Combine WEPP and WEPS
Location of Project: The National Soil Erosion Research Laboratory (NSERL) is a cooperative research endeavor of the USDA-Agricultural Research Service and Purdue University.
Goal: The incumbent would develop components in the Objective Modeling System (OMS) framework (ARS-Ft. Collins) for simulation of erosion by wind and by overland flow of water, utilizing common components for hydrology, plant growth, and soil water balance.
Expected Outcomes: This project would make important contributions to development of a common, physical process-based model that would allow for simulation of erosion by wind, erosion by water, and potentially combined wind-water erosion on field sized areas. The outcome of this research can be used in regions of the United States and in China impacted by both wind and water erosion.

12. Title of Project: National Daily Estimation of Soil Erosion Utilizing Radar Precipitation Data
Location of Project: The National Soil Erosion Research Laboratory (NSERL) is a cooperative research endeavor of the USDA-Agricultural Research Service and Purdue University.
Goal: The incumbent would work with a team of scientists and computer specialists at the NSERL, Iowa State University, and Purdue University on implementing a national erosion estimation tool based upon a state tool currently being developed in Iowa.
Expected Outcomes: The major product from this work would be a web-based tool that would provide estimates of daily and cumulative soil loss across the United States utilizing observed precipitation information. The incumbent would learn a great deal about weather observation and measurement in the United States, procedures to create

erosion model climate inputs from observed weather data, and development of large national-scale software. The incumbent should gain sufficient knowledge to learn how to develop and implement a similar system in China. Given the short duration of this proposal (1-year), potentially only the national framework and web interface programs, and a few pilot states could be completed in this time.

13. Title of Project: Adaptation and Verification of the Wind Erosion Prediction System to Semiarid China.

Location of Project: The Wind Erosion Research Unit (WERU) in Manhattan, Kansas.

Goal: The incumbent would assist in verifying and applying the recently developed Wind Erosion Prediction System (WEPS) for conditions of the wind erosion susceptible regions of China. This would include populating the necessary databases of climate, crop, soil, and management necessary to run WEPS submodels.

Expected Outcomes: The WEPS model will be adapted for use in erosion prone areas of China. The expected results will add verification and expand utility of WEPS. It will provide a basis to evaluating erosion risk and various scenarios for reducing erosion. The advanced tool will provide better soil conservation planning and environmental assessment. The project will enhance US-China environment cooperation for air quality monitoring assessment and the professional development of collaborating scientists. It will also provide a basis for the development of an early warning system for dust emissions.

14. Title of Project: Soil Erosion Data Collection, Exchange, and Model Development and Evaluation for the US and China

Location of Project: The Southwest Watershed Research Center is located in Tucson, AZ, and operates the Walnut Gulch Experimental Watershed located in Tombstone, AZ.

Goal: The objectives of the proposal are to exchange soil erosion data from China and the US for purposes of developing and testing soil resource management technologies, and to collect new erosion data in the US in semi-arid environments and (in future cooperation) in other parts of China.

Expected Outcomes: This study will add validity and utility to both US and Chinese models, and may lead to improvements in both sets of erosion models through cross-fertilization of concepts and databases. The project will provide a basis for evaluating erosion risk and various scenarios for reducing erosion in both countries.

15. Title of Project: Water Quality Modeling of Western China and the Pacific Northwest Region of the United States

Location of Project: The Land Management and Water Conservation Research Unit (LMWCRU) in Pullman, WA.

Goal: The incumbent would contribute to water quality model development and validation with these five specific objectives: (1) improve hydrology modeling under cold season conditions, (2) develop a procedure for determining soil loss and sediment delivery focusing on rill flow, (3) develop a channel flow model based on a simplified solution to Saint-Venant equation, (4) integrate the sediment delivery procedure with the surface and channel hydrology models into a watershed model, and (5) verify the model at a watershed level and transfer the project results. This project builds upon previous related research conducted in the Pacific Northwest region and should be adaptable to conditions of Western China.

Expected Outcomes: The deliverables of the project include (1) a mathematical model that describes the hydrological processes of the agricultural watershed of the region, (2) a procedure for predicting soil loss and sediment transport in rills, (3) a watershed model focusing on sediment, and (4) technical publications and information transfer materials. The results of the project should contribute to watershed science, to management and policy making, and to the adoption of on-ground practices for improving the water quality in watersheds in Western China and the Pacific Northwest USA.

16. Title of Project: Application of the USDA Water Quality Model – AGNPS for Watershed Management Planning in China.
Location of Project and Mission of Research Station: The Upland Erosion Processes Research Unit (UEP) is an integral part of the National Sedimentation Laboratory in Oxford, Mississippi.
Goal: The incumbent would assist in validating AGNPS for watershed management planning for various farming systems and crop rotations for different soil and climatic conditions in the United States and China. The databases developed for the validated watershed using the AGNPS model will be designed as a template for further development with other watershed simulations in many regions of China under variable soil, landuse, topographic, and climatic conditions.
Expected Outcomes: Databases will be developed for use with AGNPS that will be applicable to watershed conditions within Chinese provinces. Watershed simulations will be performed to validate the application of AGNPS to these conditions. User documentation and interfaces will be modified for use in China.

17. Title of Project: Validation of New WEPP Model Water Quality Components
Location of Project: The National Soil Erosion Research Laboratory (NSERL) is a cooperative research endeavor of the USDA-Agricultural Research Service and Purdue University.
Goal: The incumbent would assist in extension, testing, and validation of new water quality components incorporated into the Water Erosion Prediction Project (WEPP) model.
Expected Outcomes: Ultimately, a new water quality model applicable to small watersheds will be developed, tested and validated, utilizing state-of-the-art hydrology and sediment generation components of the WEPP model. The incumbent in this position would work as part of a team of scientists and computer specialists on this project. The incumbent would gain considerable knowledge into current ARS erosion

prediction technology, water quality prediction technology, and water quality validation data. The tested and validated model could be a tool for water quality predictions in both the U.S. and China.

18. Title of Project: Agricultural Management Effects on Watershed Scale Nutrient and Pesticide Transport.
Location of Project: The National Soil Erosion Research Laboratory (NSERL) in West Lafayette Indiana.
Goal: The incumbent would assist in a watershed scale water quality project, using measurements and modeling techniques to predict and evaluate the effectiveness of various Best Management Practices (BMPs) in water quality protection.
Expected Outcomes: This study will improve upon the existing knowledge base concerning the role of BMPs in water quality protection, and the ability of models to predict the water quality impacts of BMPs at the watershed scale. Data from this study will aid in BMP decision making and provide a basis for BMP recommendations to address a range of water quality concerns. The incumbent will gain a working understanding of watershed scale transport processes, complex watershed hydrology, and techniques to model these.

19. Title of Project: ***Nutrient Cycling and Environmental Impacts of Dairy Farms.***
Location of Project: The US Dairy Forage Research Center (USDFRC) headquarters is on the campus of the University of Wisconsin-Madison.
Goal: The goal of this project is to share knowledge and experiences, and develop management practices that improve nutrient cycling on dairy farms in both the U.S. and China. The project will be initiated in Wisconsin (Phase I) and continue in China (Phase II). Phase I: A Chinese scientist will spend two years at the USDFRC and collaborate on a variety of lab, greenhouse and field experiments aimed at better understanding and improving manure nitrogen (N) recycling on dairy farms with an emphasis on mitigating ammonia emissions. Phase II: After returning to China, the Chinese scientist will continue studies on manure N recycling and environmental impacts of dairy farms, and Dr. Powell (USDFRC) will travel to China to obtain a more in-depth understanding of 1) the differences between dairy systems in China and the U.S.; 2) the nutrient management issues and environmental pollution related to the dairy industry in China; 3) the Chinese governmental policy and environmental laws related to the dairy industry; 4) the status of research and technology development for improving environmental impacts of dairy production in China; and 5) experimental approaches and methods used by Chinese researchers.
Expected Outcomes: Shared knowledge, experiences and methods used to evaluate the effects of management practices (e.g., diets, bedding, manure storage and land application) on manure N recycling will be applicable to U.S. and Chinese dairy farms.

20. Title of Project: Change in Soil Organic Carbon Content as A Result of 50+ Years of Management.
Location of Project: The Grassland Soil and Water Research Laboratory in Temple, Texas.
Goal: The incumbent would assist in developing and modeling data comparing current soil organic carbon content with that found in archived soil samples. The archived samples were

taken from identifiable locations that have experienced a wide range of management practices. This includes native pastures and agricultural production sites. These locations have been maintained and management practices recorded for this period of time, as have local weather conditions. The resultant data will be used to validate and improve an agricultural simulation model, EPIC.
Expected Outcomes: Validation and refinement of the EPIC model will provide a tool that can be applied to Chinese conditions. The experience gained while validating the EPIC model will be invaluable in applying the model to evaluate Chinese management practices.

21. Title of Project: Identification of Manure Application Methods for Sustainable Cropping Systems.
Location of Project: The National Soil Erosion Research Laboratory (NSERL) in West Lafayette Indiana.
Goal: The incumbent would assist in an experiment to determine the overall effects on the environment resulting from various manure application methods. The environmental effects to be evaluated include nutrient (N, P and metals) losses from runoff and/or leaching, and gaseous losses of CO_2, CH_4 and N_2O. Manure will be applied to land cropped in a corn/soybean rotation using several injection techniques and using fall and spring applications of manure. Runoff simulation studies will be performed to determine the effect of these application practices on surface water quality, to include sediment, nutrient and hormone losses. Trace gas fluxes will be measured using a vented chamber technique. These data will be analyzed to identify the best management practices, which provide the optimal environmental protection for both water and air.
Expected Outcomes: Data from this study will provide information that can be used to make recommendations for manure application methods to animal producers in the Midwest region of the United States, to optimize environmental protection, while enabling the application of this valuable fertilizer resource. Data from trace gas analysis will be part of the USDA-ARS GRACEnet project that has been initiated to quantify and reduce trace gas emissions and increase C and N sequestration from agricultural practices. Information gathered here can also be used to enhance the predictive capabilities of models used to estimate nutrient losses from agricultural operations.

22. Title of Project: Global Change Effects on Crop Residue and Nutrient Cycle Dynamics and Erosion.
Location of Project: The National Soil Erosion Research Laboratory (NSERL) in West Lafayette Indiana.
Goal: Surface managed crop residue remains the primary method for controlling erosion from farm fields. There is little information regarding the impact that global change might have on the decomposition rates of crop residues and the resulting effect on surface cover and erosion protection as well as nutrient release from the decaying residues. A series of laboratory and field experiments would seek to quantify changes in the crop residue decomposition processes and nutrient release patterns under different global change scenarios. Primary crops used would be corn, soybean, winter wheat, sorghum, and / or cotton.

Expected Outcomes: Data from this study will provide information that can be used to make soil resource management decisions with regard to surface managing crop residues for erosion control and nutrient applications. This would be a side project of the USDA-ARS GRACEnet project that has been initiated to quantify and reduce trace gas emissions and increase C and N sequestration from agricultural practices. Information gathered here can also be used to enhance the predictive capabilities of models used to estimate erosion losses from agricultural operations especially under global change conditions.

23. Title of Project: Trace Gas Emission from Different Cropping and Management Systems.
Location of Project: The National Soil Erosion Research Laboratory (NSERL) in West Lafayette Indiana.
Goal: To understand the impact of tillage and cropping systems on the changes in trace gas fluxes such as NO_2, CO_2 and CH_4. Systems studied would include a spring chisel/fall disc corn/soybean rotation (conventional tillage), no-till corn/soybean rotation, no-till corn/soybean rotation with winter rye as a cover crop, and a precision tillage corn/soybean rotation. Additional plots would look at the ability of various grass species to sequester large amounts of C into the soil.
Expected Outcomes: Data from this study will provide information that can be used to make soil resource management decisions with regard to mitigating greenhouse gas production and sequestering carbon while minimizing impacts of pesticide and nutrient applications. This would be part of the USDA-ARS GRACEnet project that has been initiated to quantify and reduce trace gas emissions and increase C and N sequestration from agricultural practices. Information gathered here can also be used to enhance the predictive capabilities of models used to estimate erosion losses from agricultural operations especially under global change conditions.

24. Title of Project: Microbial Activity as Soil Quality Indicator.
Location of Project: The National Soil Erosion Research Laboratory (NSERL) in West Lafayette Indiana.
Goal: As a soil is degraded, there are changes in the soil biota, which in turn alter the soil structure, erodibility, tendency to crust, and erodibility. There is a need to determine a set of early warning indicators that the soil is being degraded. Early warning indicators are those that will show significant changes between 1 to 3 years after a change in management, so that early intervention through changes in management systems can take place. While changes in total C is one good indicator of soil degradation, it often takes 1 to 10 years for significant changes to occur. One possible set of early warning indicators might be changes in the average microbial activity as indicated by enzymatic activities. A general toward trend in any of these cycles, after accounting for seasonal and diurnal variations, is an indicator of reductions in soil microbial activity and the soil environment. These and other enzymes are more sensitive to changes in tillage practices than is the total organic C content of the soil. Understanding the precise relationships between these enzyme activities and later soil degradation may provide a much needed

set of early warning indicators of reduced soil quality. The approach would combine laboratory and field studies to determine appropriate variables for corn-soybean systems.
Expected Outcomes: Data from this study will provide information on changes that occur in the soil biology and biochemistry as a result of changes in soil conditions due to progressive degradation. Further, this information could lead to early warning indicators for identifying management systems that could be harmful to soil health.

25. Title of Project: Assessing Impacts of Conservation Practices Within a Watershed Context.
Location of Project: The Grazinglands Research Laboratory in El Reno, Oklahoma.
Goal: Conservation practices are often implemented and maintained at a farm scale. To assess conservation policies, federal, state, and local agencies often need to assess cumulative conservation benefits across a watershed. Some models operate at a large scale (e.g., the Soil Water Assessment Tool, SWAT) where it is difficult to detect the impact of a particular conservation practice at a particular location. Other models (e.g. the Water Erosion Prediction Project, WEPP) were developed to evaluate effectiveness of site-specific practices, but there is no operational method to scale up to a large watershed scale. The visiting scientist would assist in developing procedures for calibrating and validating SWAT, WEPP, and other models to operate as a suite across a range of scales to evaluate impacts of conservation practices at selected sites and watersheds in both countries. The research will utilize historic data from LWREW, data from instrumented watersheds in China, controlled experimental plots in both countries, satellite imagery, and national soils, climate, and agricultural databases.
Expected Outcomes: New watershed assessment procedures should improve the ability of governments in the US and China to more quantitatively assess environmental impacts of investments in conservation on agricultural and grazing lands. The analysis will pave the way for more effective tools to target location and types of future conservation practices to address specific water quality, ecological, or water quantity problems that are identified in a watershed.

26. Title of Project: Extension and Application of GPFARM Decision Support Software to Gansu Province, Peoples' Republic of China.
Location of Project: The Great Plains System Research Unit (GPSR) in Fort Collins**,** Colorado
Goal: The incumbent would be trained in the science background and application of GPFARM, a USDA-ARS decision support software package for long-term strategic planning by farmers, ranchers, and agricultural advisors. On return to China, the incumbent would first test, modify, enhance, and validate GPFARM against available experimental data in the Gansu province, PRC. Then, he/she will lead an effort in assembling the local databases of soils, climate, resources, management practices, and economic parameters for applying GPFARM, with a goal of analyzing potentials and risks of alternative cropping systems for different soil and climatic conditions in Gansu. GPFARM will be used to determine cash flow, economic returns and environmental impacts at both regional and local scales as a function of alternative cropping systems. A graphical database/atlas of experimental data and model simulations will serve to analyze economic and environmental (soil erosion and nutrient loss) potentials and risks.

Expected Outcomes: The incumbent would be prepared to test and utilize GPFARM with Gansu province data. The incumbent would utilize the modified GPFARM model to compare and contrast current cropping system performance with alternative cropping systems.

27. Title of Project: River Basin Planning and Management in the United States and China.
Location of Project: The Grassland Soil and Water Research Laboratory in Temple, Texas.
Goal: The incumbent would assist in developing input data and validating a river basin model (SWAT) to analyze the impact of climate and land management on water supply, water quality and reservoir sedimentation for river basins in the US and China. The validated SWAT model will be used to quantify the impact of cropping and tillage systems on river flows and reservoir water supply and sedimentation. Expected reservoir life will be estimated as a function of land management and projected climatic conditions. Crop yields in the basin will also be simulated by SWAT to obtain an economic analysis of cropping system scenarios.
Expected Outcomes: Validation and refinement of the SWAT model to both US and Chinese conditions. One or more basins in China will be selected for application and validation as identified by the incumbent. Required new and refined model components will be identified during model application and validation (such as refined sediment transport or new salinity routines). Existing regional databases in China will be examined and developed for routine application of the model over large regions of the country. User manuals will be developed for routine application of the refined model.

28. Title of Project: Improved Pasture and Forage for Western USA and China.
Location of Project: The Forage and Range Research Laboratory (FRRL) in Logan, UT.
Goal: The incumbent would assist, through selection, in the development of improved orchardgrass, meadow brome, and smooth brome grass cultivars. The orchardgrass and smooth brome grass populations originated from plant materials collected in 1997 in the Yili Valley area of Xinjiang Autonomous Region, PRC in 1997. These populations will be selected for improved performance under drought, winter hardiness, seedling vigor, and forage regrowth under repeated grazing. The incumbent would also assist in describing chromosome number and morphological variation is a very large collection of forage Kochia. Forage kochia is being used extensively as a forage species when revegetating damaged rangelands.
Expected Outcomes: Improved cultivars of orchardgrass, meadow brome, and smooth brome grasses will be developed that will provide a more stable source of high quality forage throughout the grazing season. They will be easier to establish under less than optimum conditions, and less susceptible to winter injury. Given the geographical similarities between the Intermountain West (Western U.S.) and that of the Western Chinese provinces, the plant materials developed through this interaction will enhance each regions ability to up-grade the quality of their pastures and forage fed to livestock.

The development of distinct populations of forage kochia based on chromosome number will enhance the development of new cultivars for rangeland revegetation.

29. Title of Project: Identification and Evaluation of Genes in Cool-Season Perennial Range Grasses Adapted to the Western Arid Steppe grazinglands of China and the United States.
Location of Project: The Forage and Range Research Laboratory (FRRL) Research in Logan, Utah.
Goal: The incumbent will conduct high-resolution genetic mapping experiments using advanced experimental populations derived by marker-assisted selection of established linkage groups and chromosome regions that evidently control functional traits in perennial *Leymus* wildryes. The incumbent will utilize high-throughput DNA genotyping procedures and help evaluate rhizome proliferation, seed dormancy, salt-tolerance, and other functional traits. The incumbent will utilize conserved gene sequences (anchor markers) in *Leymus*, to compare and identify corresponding chromosome regions of rice and other plants that have been cloned and sequenced. The incumbent will help construct new genetic linkage maps for inter-specific mapping populations of perennial *Elymus* wheatgrasses. The incumbent will be encouraged to review, plan, and initiate similar genetic research involving other perennial grass species native to the grazinglands of western China, including Asiatic *Leymus* and *Elymus* species.
Expected Outcomes: The incumbent will advance gene discovery and plant improvement research in the U.S. In particular, the incumbent will help validate, localize, and evaluate genes controlling rhizome proliferation, seed dormancy, salt-tolerance, and other functional traits of perennial range grasses. The incumbent will gain valuable experience using state-of-the art DNA genotyping techniques at the USU Biotechnology and Genomics Research Center and, via interactions at FRRL, gain a specialized knowledge of perennial grasses and other grazingland plants that are uniquely adapted to the semiarid rangelands of western United States and China. Plant materials and research data will be available to cooperating institutions.

30. Title of Project: Genome Relationships of *Kochia* Species from China, Kazakhstan, Uzbekistan, and United States.
Location of Project: The Forage and Range Research Laboratory (FRRL) in Logan, Utah.
Goal: The incumbent would assist in determining genome relationships among *Kochia* species from China, Kazakhstan, Uzbekistan, and United States. A combination of molecular and cytological techniques will be used to assess species relationships for developing efficient breeding strategies. Results from completed and on-going molecular marker (AFLP, RAPD, STS) and genomic *in situ* hybridization (GISH) studies will be extended and applied to new accessions and species assembled for this project.
Expected Outcomes: A new understanding and strategy will be developed that efficiently utilizes *Kochia* germplasm for improving the forage Kochia's potential in forage-animal production, soil conservation, and control of desertification for Western region of the United States and Western Chinese provinces. New breeding materials will be generated through cross-hybridization between selected germplasm lines from the collection. These breeding populations will be shared by U.S. and Chinese breeders for

field evaluation and selection in both countries. New forage *Kochia* cultivars will be developed to broaden the genetic base of forage kochia, currently being restricted by one cultivar 'Immigrant' only.

31. Title of Project: Can Restored Grasslands Improve Animal Nutrition and Productivity?
Location of Project: The Northern Great Plains Research Laboratory in Mandan, North Dakota.
Goal: The goal of this project is to determine if the restoration of native grasslands dominated by cool-season perennial grasses is economically feasible for livestock producers. The incumbent will assist in determining the rate of recovery of the native grass component from multiple restoration treatments on a native grassland currently dominated by cool-season perennial grasses. The incumbent will also assist in evaluating diet quality and animal productivity from grasslands dominated by introduced cool-season perennial grasses and those that a native grass component has been restored. Diet quality will be assessed using fecal NIRS technology and productivity will be estimated from diet quality and forage productivity. **Expected Outcomes:** The rate of recovery of a native grass component will be determined for multiple restoration treatments. This information will be combined with the information on diet quality and productivity to determine the economic feasibility of restoring native grasslands under different intensities of introduced cool-season grass invasion. Land managers can then determine the risks and benefits of alternative restoration management practices on rangelands.

32. Title of Project: Heifer Production on Cool-Season Forages.
Location of Project: The Fort Keogh Livestock and Range Research Laboratory (LARRL) in Miles City, MT.
Goal: The incumbent would assist in conducting a study designed to assess persistence, growth, and quality characteristics of cool-season wheatgrasses and wildryes grazed in an integrated forage system with cool-season grass dominated native range. Performance of heifers grazing in the integrated forage system using both native range (summer) and the seeded cool-season forages (spring and autumn) with those grazing only native range during spring, summer, autumn would be compared by assessing gains. Relationships of forage standing crop, forage quality, and diet quality with livestock gains would be investigated.
Expected Outcomes: This research will provide needed information about the persistence, growth, and quality characteristics of cool-season wheatgrasses and wildryes and performance of livestock grazing these forages in the environment of the Northern Great Plains. Obtaining this information is a key first step in developing successful management strategies that includes seeded forages. Past research at this location has shown that increased heifer gains obtained on seeded pastures compared to native rangeland during spring grazing were not always maintained through summer. The findings would provide a base of information for the incumbent to utilize in determining the feasibility of utilizing an integrated forage system for livestock production in China.

33. Title of Project: Validation of Techniques for the Estimation of Diet Quality in Grazing Ruminants

Location of Project: The Fort Keogh Livestock and Range Research Laboratory in Miles City, Montana.
Goal: The incumbent would assist in testing techniques to measure diet quality of grazing ruminants, such as the use of *in vitro* gas production measures, and to test the relationship of these measures to animal performance in rangeland-based beef cow production systems.
Expected Outcomes: Certain forage quality techniques, such as in vitro gas production systems, have been used primarily to evaluate the quality of harvested forages. Limited research has been conducted on the value of these techniques to evaluate the diet quality of ruminants grazing in botanically diverse, extensive environments. This technique has the potential to assess the impact of seasonal variation in dietary quality and composition on ruminal fermentation characteristics and potential animal response without the use of expensive animal experimentation. Development of rapid and inexpensive forage quality techniques will allow for the development of appropriate supplementation tactics to overcome nutritional limitations to rangeland-based animal production.

34. Title of Project: Developing an Agricultural, Environmental, and Natural Resources Mapping and Decision Support System (DSS) for Mitigating Desertification in Northern and Western China
Location of Project: The Visiting Scholar/Scientist will work at various laboratories, facilities, and offices at Oregon State University in Corvallis, the Desert Research Institute in both Reno and Las Vegas, and other key laboratories in the U.S.
Goal: A multidisciplinary team of scientists and international development specialists with experience in agriculture, forestry, land degradation, germplasm collection and evaluation, and natural resource management will be developing a mapping and decision support system (DSS) that will improve natural resource management while protecting fragile ecosystems key to providing for a sustainable future. The strategy is to focus on near-term and longer-term strategies that will provide for changing societies in China's drylands. The team will be working with key scientists, policy makers, and/or land managers in China's drylands. We propose that such a person with these capabilities and interests work with counterparts at Oregon State University, the Desert Research Institute, and other institutions.
Expected Outcomes: The products that will be produced through this effort will be a series of spatially-referenced data sets of terrain, soils, climate, vegetation, and species environmental tolerances. Integrated within a web-based decision support system including an Internet Map Server and alternative futures framework, such a strategy will be useful for institution building and professional development as well as land management needs at the Provincial and National levels. The person selected to participate in the project will play a key role in both developing the system as well as implementing it in China.

35. Title of Project: Economic and Environmental Sustainability of Agro-ecosystems in Western China and the Great Plains Region of the United States.
Location of Project: The Great Plains System Research Unit (GPSR) in Fort Collins, Colorado.
Goal: The incumbent would assist in validating a decision aid (GPFARM) for farmers and ranchers to analyze potentials and risks of alternative livestock systems and crop

rotations for different soil and climatic conditions in the western provinces of China. The validated GPFARM model will be used to synthesize and quantify the performance of livestock-cropping systems interactions as a function of soil and climate conditions. Year to year variability of results will be related to probability distributions of rainfall (amount, frequency, and intensity) and cropping system rotations. GPFARM will be used to determine cash flow, economic returns and environmental impacts at both regional and local scales as a function of intensity of alternative livestock-cropping systems.
Expected Outcomes: A new model component will be developed that assesses the impact of removing standing crop residue by grazing livestock. This component will assess livestock performance and interactions with future crop production (i.e., grazing winter wheat and alfalfa). The component will be developed and validated for Central Great Plains region of the United States and Western Chinese provinces and provide a means of assessing the probability of successfully introducing new livestock and cropping systems into both regions.

36. Title of Project: Remote Sensing and Habitat Management of Rangeland Resources with Special Emphasis on Identification of Invasive Weeds
Location of Project: The Exotic and Invasive Weeds Research Unit (EIWRU) in Albany, CA.
Goal: The incumbent would assist in conducting and evaluating remote sensing techniques for assessing rangeland conditions including beneficial vegetative cover, invasive weed problems and abiotic environmental conditions. A combination of remote sensing, modeling and geographic information system applications will be developed and used in the proposed studies. Currently, USDA-ARS, University of California Berkeley and NASA are working together to develop an advanced program to conduct this research.
Expected Outcomes: Preliminary research has been conducted showing potential to identify critical invasive weed species such as Tamarix, starthistle, and giant reed in affected habitats. We are expecting to develop an improved ability to detect both invasive weed species and their insect biological control agent, and to identify and assess beneficial rangeland species. These remote sensing technologies are intended both to assist us with on-going research and to aid land managers in taking both control actions and assessing the outcomes of actions previously implemented.

37. Title of Project: Annual Weed Invasion Following Wildfire on Sagebrush-Steppe Rangelands in the Western U.S.A.
Location of Project: The USDA-ARS Forage and Range Research Laboratory (FRRL) in Logan, Utah.
Goal: Wildfire is one of the primary factors that affect vegetation change in the western U.S.A. and other parts of the world. Damage by wildfire may eliminate vegetation structure and function required for native species to naturally regenerate. In addition, burned wildfire places native communities at serious risk to invasion by weedy annual plants. The main objective of the research will be to determine which conditions favor the establishment of native plant communities and which conditions promote invasion by annual plants. The visiting scientist would cooperatively conduct a series of field

experiments in recently burned rangelands to determine possible trajectories of secondary succession in the burned areas. Combinations of various weed control and fertilizer treatments will be applied to the burned site to determine which treatment combinations increase site stability and facilitate regeneration of native plants as opposed to those treatments which promote invasion by weedy annual plants. Field measurements of vegetation dynamics will be obtained to determine the proportion of native and invasive species in the various field treatments and identify the treatment combinations that facilitate regeneration by native species.
Expected Outcomes: These field experiments will allow the development of new information to assist in promoting the establishment of native plant communities following wildfire on key rangelands of the western U.S.A. Results will help identify the best techniques and post-fire treatments to help facilitate site stability and the subsequent establishment of native plant species in disturbed rangeland areas. Many of these same techniques and principles will be applicable in the regeneration and reclamation of burned areas, degraded rangelands, and abandoned croplands in the western provinces of China.

38. Title of Project: Predicting the Influence of Global Change on Invasive Weeds in Semi-Arid Rangeland Ecosystems.
Location of Project: The Rangeland Resources Research Unit (RRRU) in Fort Collins, CO.
Goal: As atmospheric CO_2 concentrations continue to increase, associated climatic changes may have dramatic effects on plant invasions. Predicted changes in precipitation, atmospheric nitrogen deposition, and CO_2 concentration might be expected to reduce adaptation of native perennial grasses while favoring herbaceous dicots and winter annual grasses. The primary objective of this project will be to test effects of global change on the invasibility of semi-arid rangeland ecosystems. The work will be conducted in the mixed grass prairie, the most extensive grassland ecosystem in the USA, and will examine multiple weed species and functional groups. Due to the focus on semi-arid rangeland, primary importance will be given to studying the influence of altered patterns of precipitation on invasion. The incumbent will also have the opportunity to participate in a free air CO_2 enrichment (FACE) study, and to examine interactive effects of Nitrogen deposition and precipitation patterns.
Expected Outcomes: The results of this project will help to predict the effects of global climate change on the invasibility of rangeland ecosystems. A second outcome will be insight into the relative responses of different types of weeds to climate change. This knowledge will help livestock producers and rangeland managers prioritize weed control efforts. Finally, this work will contribute to our understanding of the role of resource competition, particularly competition for water, in weed invasions of semi-arid rangeland ecosystems. Understanding how resource competition influences invasion is needed to develop long term, cost effective strategies for managing rangeland weeds.

39. Title of Project: Testing the Enemy Release Hypothesis for Weeds of Semi-Arid Grazingland Ecosystems in China and the USA.
Location of Project: The Rangeland Resources Research Unit (RRRU) in Fort Collins, CO.

Goal: The enemy release hypothesis (ERH) suggests that invasive exotic weeds succeed because they lack natural enemies that would regulate their populations in their native range. The role of enemy release in driving weed invasions in grazinglands is critical to decisions about how to control weeds (for example, whether to pursue biological control). Nevertheless, direct tests of the ERH are rare. The goal of this project is to compare effects of natural enemies on exotic weeds in their native and exotic ranges. Effects of enemies will be measured by excluding enemies of both the exotic weeds and associated competitors in the field, and measuring effects on competition. For each weed species studied, populations will be identified in both China and the USA and pesticides will be used to exclude insects and diseases in the area of the population. The ratio of weed biomass to community biomass can then be compared among treatments and countries. Because species native to the USA are currently weeds in China and vice versa, we will have the opportunity to create a reciprocal set of experiments, testing the importance of the ERH for weeds of both Chinese and US grazinglands.
Expected Outcomes: This work will contribute to our understanding of the ecology of invasive species through a strong test of the enemy release hypothesis. The international nature of the project provides a unique opportunity to test this inherently international hypothesis. The results will provide a measure of the role of enemy release in weed invasions of Chinese and US grazinglands. Knowledge of the role of natural enemies will in turn provide insight into the relative importance of biological control and other weed control strategies.

40. Title of Project: Developing Revegetation Guidelines for Weed Dominated Rangelands.
Location of Project: Eastern Oregon Agricultural Research Center (EOARC) in Burns, Oregon.
Goal: The incumbent would assist in developing guidelines for revegetation of weed-dominated rangelands. These guidelines will increase the success and cost-effectiveness of conversion of weed-dominated plant communities to plant communities that better meet land management objectives such as increased biodiversity, improved wildlife habitat, and increased production of forage for wildlife and livestock.
Expected Outcomes: A model-based decision-support tool will be developed that allows land managers to better predict the cost and success, both short- and long-term, of revegetation of weed-dominated rangeland. Through sensitivity analysis and identification of thresholds, the model will identify key mechanisms and processes involved in plant community dynamics. This decision-support tool will be based on measurable environmental and economic variables, thus allowing for the development of revegetation guidelines tailored to a wide range of biological life zones and economic conditions.

41. Title of Project: Rangeland Restoration After Fire: Role of Pre-fire Vegetation Type and Density, and the Size and Intensity of the Fire, on Post-fire Vegetation Recovery
Location of Project: This research will be conducted at the USDA, ARS, U.S. Sheep Experiment Station (USSES), which is located near Dubois, Idaho.
Goal: The incumbent will contribute to USSES research conducted under NP 205, Rangeland, Pasture, and Forages. The incumbent will use a variety of methods for

classifying and quantifying vegetation, defining soil properties, defining seed banks, and analyzing and interpreting data collected before and after significant rangeland disturbance. In addition to enhancing ARS research efforts, these methods will be applicable to research conducted in China. Data from China can be used to help validate restoration models developed at the USSES. Rangeland disturbances, such as wildfires, may destroy soils and native seed banks, promoting the invasion of exotic weeds and slowing or preventing the spontaneous return of native plants. Determining whether sheep grazing and other interventions can be used to restore native vegetation after significant disturbance, such as wildfire, is critical for sustaining rangeland ecosystems. Thus, the overall goal for the research is to determine the relationship between vegetation type and density before a fire and the size and intensity of the fire on vegetation recovery.
Expected Outcomes: The research will be used to develop grazing and prescribed-fire strategies to sustain healthy rangelands, restore degraded rangelands, and continue livestock grazing that is compatible with rangeland ecosystems and livestock production goals. In addition, data from the project will used to determine whether restoration and grazing strategies are truly improving grazing land ecosystems.

42. Title of Project: Technologies for Remediation of Degraded Rangelands
Location of Project: The Range Management Unit at the Jornada Experimental Range (JER) in New Mexico.
Goal: The incumbent would serve as a range ecologist cooperating with other unit scientists in developing new, ecologically based technologies to remediate degraded arid rangelands. The incumbent would collaborate on studies designed to quantify the important of landscape context and connections among spatial units to ecosystem dynamics and biotic patterns associated with remediation successes. Further details of this research objective and the research program at the JER can be viewed at: usda-ars.nmsu.edu.
Expected Outcomes: Results are expected that would substantially contribute to understanding of resilience and resistance in desert environments. Research will lead to development of specific technologies for remediating lands in southwestern United States with applications for Western Chinese provinces. Results will also contribute to understanding key processes of desertification.

43. Title of Project: Effects of Historical Disturbance Regime on Species Response to Grassland Fire.
Location of Project: Fort Keogh Livestock and Range Research Laboratory (LARRL) is located in eastern Montana near Miles City.
Goal: Eastern Montana and the Lanzhou region of China share similar climates and some plant species believed to be indigenous to both areas. These conditions provide unique opportunities to examine the effects that different long-term disturbance regimes may have on the ability of individual species to tolerate a perturbation such as fire. The incumbent would assist with the experimental application of prescribed fire to plants common to the Chinese and U.S. study locations (e.g. *Koeleria macrantha, Artemisia frigida,* and *Hesperostipa spp.* or *Nassella spp.*), measurement of plant responses to fire, and synthesis of data.

Expected Outcomes: Comparisons of the effects historical disturbance regimes have on a species' tolerance to perturbation are typically precluded by limitations in a species' geographical range and lack of variability in disturbance history. Examining fire effects on species indigenous to western China and the Northern Great Plains will have implications about the effects of disturbance regimes under which species are believed to have evolved and the importance, or lack thereof, in mimicking these regimes for the restoration or maintenance of rangeland plant communities.
the effect of historical disturbance regime on a species' response to fire.

44. Title of Project: Geospatial Attributes Affecting Beef Cattle Distribution and Resource Use of Extensive Rangelands in Western China and the Northern Great Basin.
Location of Project: The Eastern Oregon Agricultural Research Center (EOARC).
Goal: The incumbent would assist with planning and execution of research documenting geospatial aspects of livestock distribution in extensive replicated pastures with Geographic Positioning System (GPS) collars. These data will be analyzed with Geographic Information System (GIS) software to determine which physical landscape and forage quality attributes most significantly affect or limit beef cattle distribution. Efficacy of management practices designed to rectify livestock distribution problems would also be evaluated with these same procedures. In many extensive grazing systems, as much as 30 to 40 percent of the landscape and its herbage are unused by stock resulting in wasted forage and lost income opportunities. These findings will help identify geospatial constraints on beef cattle production and identify management practices that can in many instances expand the effective forage base.
Expected Outcomes: These findings will give managers of extensive holdings the ability to identify which portions of their landscapes are suitable or unsuitable for livestock grazing and a method for more accurately assessing the actual stocking potentials realized forage values of their lands. In a similar vein, stockmen will be able to identify previously unused portions of the landscape and develop effective management programs that will effectively lure animals to these areas to exploit there productive potentials. Because this research is an integrated examination of innate livestock capabilities and landscape characteristics, findings should be applicable to an extremely wide array of environments in the United States and China.

45. Title of Project: Use of Hyperspectral Radiometry in Prediction of Forage Intake and Animal Performance of Grazing Livestock in Western China and the Southern Great Plains of the US
Location of Project: The Grazinglands Research Laboratory in El Reno, OK.
Goal: The incumbent would assist in the development of models to predict sheep and cattle forage intake, body weight gains, livestock nutrient deficiencies, and pasture forage dry matter disappearance in improved and native grasslands in western China and the Southern Great Plains of the U. S. Data used in model development would include *in situ* forage canopy reflectance measures from hyperspectral radiometers, forage quality and intake data from conventional forage and marker laboratory analyses, and livestock weights and gains. The validated prediction models will use *in situ* forage canopy reflectance measures and animal weights to determine appropriate stocking rates of grasslands and nutrient supplementation needs of livestock.

Expected Outcomes: Models using field data from mobile hyperspectral radiometers will be developed to provide optimal stocking rates of improved and native grasslands and guidelines for precision supplementation of grazing livestock to protect the grasslands and enhance herd and flock productivity for herders. The technology will allow assessment of specific areas for grazing and also provide frequent periodic updates of predicted forage intake, animal nutrient deficiencies, animal gains, and forage dry matter disappearance during the grazing season to guide adjustments in stocking rates and/or supplementation needed for grassland sustainability. Real-time application of remote-sensing based models will improve the ability to promote sustainable grazing systems and grassland restoration.

46. Title of Project: Effects of Long-Term Grazing Systems on Surface Soil Condition and Ecosystem Processes
Location of Project: The project will be conducted at the Northern Great Plains Research Laboratory (NGPRL) in Mandan, ND.
Goal: The sustainability of grazing systems in Western Chinese provinces is challenged by the increased demand for beef in Asia. Sustainable grazing systems require management emphasis on maintaining soil conditions capable of supporting multiple ecosystem processes. The incumbent will evaluate the effects of three long-term grazing treatments on soil properties known to affect important ecosystem processes, such as hydrologic function and biomass production. The grazing treatments, all established in 1916, include, 1) heavy grazing (0.9 ha steer^{-1}), 2) moderate grazing (2.6 ha steer^{-1}), and 3) an ungrazed enclosure. Evaluations of soil properties will include a standard set of soil quality indicators to a depth of 30 cm. Hydraulic function will be evaluated through assessments of infiltration rate and saturated hydraulic conductivity, while biomass production will be assessed by periodic measurements of aboveground biomass during the growing season. Results from measurements will be evaluated using traditional statistical analyses, as well as with a Soil Assessment Framework Tool (SMFT), which will provide a relative assessment of system sustainability.
Expected Outcomes: This project will provide understanding of the impact of long-term grazing impacts on soil condition and important ecosystem processes and lead to increased sustainability for the northern Great Plains and similar eco-regions in Western Chinese provinces. Assessments with the SMFT will provide a relative measure of system sustainability, as well as provide data to improve upon relationships between soil properties and ecosystem processes, which are currently poorly defined in the SMFT for grazing systems.

47. Title of Project: Implications of Shifting Weather Patterns and Effects on the Ecology of Grassland Ecosystems.
Location of Project: Fort Keogh Livestock and Range Research Laboratory (LARRL) is located in eastern Montana near Miles City.
Goal: Weather is the dominant factor affecting arid and semi-arid ecosystems. Short-term effects of weather change have been observed in numerous ecosystems, but the effects of long-term changes in weather patterns are not well-documented. The opportunity exists to describe the ecological consequences of shifting precipitation patterns by direct comparisons between rangeland ecosystems in western China and the

Northern Great Plains of the U.S. Miles City and Lanzhou are similar in annual temperature patterns, total annual precipitation, and plant taxonomic pools, but the timing of precipitation varies between locations. The incumbent would assist with data acquisition and subsequent comparisons of the structure and function of these otherwise similar ecosystems to determine the potential effects of climate change with specific reference to the temporal distribution of precipitation.
Expected Outcomes: A direct intercontinental comparison between similar ecosystems will allow scientists to move beyond the current suppositions about potential effects of global climate change by quantitatively assessing the ecological ramifications of long-term precipitation patterns. Results will have implications for current and future resource management, with respect to the efficiency of energy capture and assimilation into products suitable for human use.

48. Title of Project: **Rangeland Risk Reduction Drought Management Strategies.**
Location of Project: **Research will be accomplished at the Fort Keogh Livestock & Range Research Laboratory (LARRL) located near Miles City, MT.**
Goal: **Incumbent will assist in conduct of study designed to relate the quantitative impacts of spring drought, followed by above average summer precipitation, on annual forage production and plant species composition. Findings, when combined with results from previous spring and summer drought studies conducted at this location, will provide database for assessing the impact of varying annual precipitation patterns on herbage growth dynamics and production and the modifying effects of livestock grazing on said variables.**
Expected Outcomes: **These understandings will be linked to probabilities of occurrence of varying seasonal precipitation patterns, based on a 115-year location data set, to develop simple, user-friendly decision support systems that will reduce both ecological and economic risks in the management of Northern Great Plains rangeland ecosystems. Said technology will then be modified and adapted to similar eco-regions of Western China as a means of reducing associated risks.**

49. Title of Project: Holistic Comparative Studies on Landscape-Complex Dynamics of the Western Arid Regions of USA and China
Location of Project: The USDA-ARS Grassland Protection Research Unit (GPRU) in Temple, Texas.
Goal: The primary goal of this project is to establish a cross reference to assess sustainability of arid regions in both US and China and their impacts on global change. The proposed study will take an integrated approach to examine the inter-relationship among key driving forces, states, impacts and responses. The regions for study and comparison will consist of Gobi Desert and its vicinity in China and the Great Basin Desert and its vicinity in the US. Specific objectives include: for the two studies areas of arid regions, 1) identifying and comparing key driving forces for change, 2) characterizing their collective contributions to the landscape dynamics 3) developing a set of sustainability indicators for assessing the impacts from the change and to the change, and 5) delineating plausible responses of the landscape system to the impacts.
Expected Outcomes: This study aims at establishing a holistic framework for depicting arid region landscape dynamics. Based on this framework, a pressure-state-impact-

response (PSIR) model will be developed. It will result in a better understanding of the sustainability of arid regions in both countries and its impact on global change. By applying such model, discoveries and findings may be synthesized for reference in pertinent policy and strategy development for managing arid land ecosystems for both countries.

50. Title of Project: Regional assessment of forage production and rangeland health in the Southwestern United States and Western China.

Location of Project: The Southwest Watershed Research Center (SWRC) in Tucson, Arizona.

Goal: The incumbent will adapt algorithms for estimating canopy cover, plant height, and standing biomass on grasslands in the southwestern US using Landsat imagery to grassland communities in China. Algorithms currently under development in a joint ARS/EPA project to classify the health of grassland into the categories of healthy, at risk, or unhealthy, and to identify the causes of risks of those areas considered to be at risk would also be tested in China. The incumbent will work with policy makers and land managers in China to determine the most appropriate method and format for delivering the information on grassland productivity and health.

Expected Outcomes: Existing algorithms to quantify grassland characteristics will be adapted and validated for the grassland communities in the southwestern US and western China. Data products based on Landsat imagery will be developed to improve decision-making by quantifying production over large areas and identifying those areas that will most benefit from conservation measures. At the end of the project the incumbent will be able to assess the scope of the research effort needed to apply the same approach to grasslands across western China using MODIS imagery.

51. Title of Project: Identification of Genetic Polymorphisms Affecting Forage Consumption by Beef Cattle.

Location of Project: The Fort Keogh Livestock and Range Research Laboratory in Miles City, Montana.

Goal: The incumbent would identify quantitative trait loci affecting food intake by cattle and screen samples of bovine germplasm from the western provinces of China for informative genetic markers in the region of the quantitative trait loci. Association studies with individually fed animals, conducted at Fort Keogh Livestock and Range Research Laboratory and in China, will result in validation of the genetic markers. This research builds on current studies at Fort Keogh Livestock and Range Research Laboratory to identify quantitative trait loci for a variety of characteristics with relevance to economic and ecological sustainability.

Expected Outcomes: Identifying genetic markers for food intake by beef cattle will allow selection of cattle that place less demand for feed on the grazing resource, thus reducing their environmental impact. The experimental model systems developed at the Fort Keogh Livestock and Range Research Laboratory will facilitate the conduct of similar validation studies in China using germplasm from the Western Chinese provinces. Publication of the results in the scientific literature is also anticipated.

ARS Scientist/Lab: David Ow, Plant Gene Expression Center, Albany, CA

Chinese Counterpart: Xiao-Ya Chen, Shanghai Institute if Plant Physiology and Ecology (SIPPE)
Project Title: Establishment of SIBS-Berkeley Center for Plant Molecular Sciences
Duration: Delayed due to SARS. Kickoff date rescheduled for July 2004.
Comments: The Center will target 3 research goals: 1) signal transduction 2) rice genomics 3) metabolism and photosynthesis

52. Project Title: **Resistance to soybean cyst nematode**
ARS Scientist/Lab: **Randall Nelson, Soybean/Maize Germplasm, Pathology, And Genetics Research, Urbana, IL**
Chinese Counterpart: Qiu Lijuan and Chang Ruzhen, CAAS Beijing
Duration: Pending
Comments: In November 2002, Nelson met with Chinese Counterparts in Beijing who expressed concern about getting approval from Ministry due to the patenting of "genes" in Chinese germplasm. Apparently Monsanto filed for a patent on a QLT that increased yield that was derived from a Chinese wild soybean, and received enormous negative publicity in china. Still awaiting approval.

53. Project Title: Development of Durable Wheat Disease Resistance against Important Diseases between China and the United States
ARS Scientist/Lab: Xianming Chen, Wheat Genetics, Quality, Physiology, and Disease Research Unit, Pullman, WA
Chinese Counterpart: Chen Wanquan, Institute of Plant Protection, Chinese Academy of Agricultural Sciences, Beijing
Duration: Planning stages
Comments: The proposal includes four objectives: 1) To compare the evolution of virulence in the pathogen population in US and China; 2) To identify, evaluate and understand the genetic basis of resistance to pathogen of wheat developed by both countries; 3) To study the mechanism of durable host resistance to disease in wheat, and develop knowledge of durable host resistance and genetic diversity; 4) To develop molecular markers for a more efficient identification and transfer of durable resistance genes to cultivars.